

STATE REVIEWS



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**STATE REVIEWS
(Offshore Regions)**

(ADVANCE RELEASE)

**GOVERNMENT OF INDIA
MINISTRY OF MINES
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OFFSHORE REGIONS

The Government of India notified the Offshore Areas Minerals (Development & Regulation) Act, 2002 (OAMDR Act), No. 17 of 2003 in the Gazette of India, Extraordinary, Part-II, Section-1, dated 31.1.2003. The purpose of the Act is to provide for development and regulation of mineral resources in the territorial waters, continental shelf, exclusive economic zone and other maritime zones of India and to provide for matters connected therewith or incidental thereto. The Act is applicable to all minerals in offshore areas including minerals prescribed under Atomic Energy Act, 1962, but excludes oils and related hydrocarbons as there is separate legislation in force. The Act came into effect from 15.1.2010 vide S.O. 338 (E), dated 11.2.2010 as notified by the Central Government.

The Act makes it mandatory to undertake reconnaissance, exploration or production operation in the offshore areas in accordance with the prescribed terms and conditions for Reconnaissance Permit (RP), Exploration Licence (EL) or Production Lease (PL) granted under the Act and the rules made thereunder. The Act further states that availability of the areas for grant of RP, EL or PL shall be notified within six months from the commencement of the Act, and subsequently at such times as considered necessary. The Act empowers the Central Government to make rules for the purpose of the Act including terms and conditions under the RP, EL, PL, etc. The Rules, namely, the Offshore Areas Mineral Concession Rules, 2006 have been framed and notified on 3.11.2006 by G.S.R.691(E) published in the Gazette of India, Extraordinary, Part II, Section 3 (i), No. 539, dated 4.11.2006. The Rules came into effect on the date on which the Offshore Areas Mineral (Development and Regulation) Act, 2002 came into force, i.e., 15.1.2010.

As per S.O.1341(E) dated 7.6.2010, The Controller General, Indian Bureau of Mines had notified the mineral-bearing offshore blocks available for grant of Exploration Licence. As per the attached Schedule to the said Notification, there were 26 offshore areas available in offshore waters of Bay of Bengal and 37 offshore areas in the offshore waters of Arabian Sea for grant of Exploration Licence.

The orders for grant of exploration licences were issued by the Administering Authority on 05.04.2011 for the 62 exploration blocks (the bounding latitude and longitude of Block Nos. 3 & 32 falling in the Arabian Sea were same and therefore these were considered as a single block and granted as Block No. 3). Before execution of deed granting such licence, the grant of exploration licences in 62 blocks was challenged through the writ petition in the judicature of various High Courts. Due to interim orders passed by various Hon'ble High Courts on the writ petition and non-disposal of the said petition, the offshore exploration licences granted have not been executed. Besides, it was brought to the notice of the Administering Authority that some of the exploration blocks notified for grant of offshore exploration licences vide Notification dated 07.06.2010 overlapped with areas other than offshore area, to which the OAMDR Act did not apply.

The Central Government vide S.O.19 (E) dated 06.01.2011, published in the Official Gazette, declared the extent of the Coastal Regulation Zone (CRZ) and also imposed certain restrictions on the setting up and expansion of industries, operations or processes and the like in the CRZ. The said statutory order also did state that CRZ shall apply to the water and the bed area between the Low Tide Line to the territorial water limit (12 Nm) in case of seas and has prohibited in the area so identified as CRZ, inter alia, the mining of sand, rocks and other sub-strata materials except those rare minerals not available outside the CRZ area. In the context of the said notification, all the 62 offshore blocks lie within the area identified as CRZ which attracts the prohibition of mining (operation undertaken for the purpose of winning any mineral).

The OAMDR Act provides that the holder of an exploration licence for offshore area shall have the exclusive right to a production lease for winning of a mineral. In view of the effect of the CRZ Notification dated 06.01.2011, the purpose of executing the 62 offshore exploration licences could not be realised as the applicants could not undertake operations for winning of minerals inspite of grant of Production Lease after successful completion of exploration operations.

STATE REVIEWS

Therefore, taking into consideration all the above stated facts, the Controller General, IBM and administering authority Offshore Areas Minerals (Development & Regulation) vide S.O.19 (E) dated 6th January, 2011, published in the Official Gazette, annulled the Notification issued vide S.O.1341(E) dated 7th June 2010 with effect that all subsequent actions undertaken for grant of the 62 exploration licences hereby would stand rescinded.

As per S.O. 1523(E) dated 06.04.2018, the Additional Director General, National Mission Head-II, Geological Survey of India, has been notified as the "Administering Authority" for the purpose of the said Act by Clause (a) of Section (4) of the Offshore Area Mineral Development and Regulation Act, 2002, 17 of 2003 and in supersession of the notification published in Gazette of India, Extraordinary Part, II, Section 3, Subsection (ii) vide S.O. 339(E) dated 11th February 2010.

The Government of India further signed 340 contracts under NELP regime with National Oil Companies and Private (both Indian and foreign)/ Joint Venture companies. At present, 131 contracts are operational out of the total 340 contracts [(254 NELP, 56 Pre-NELP (small & medium-sized discovered field)], 30 (DSF Round) signed so far under various bidding rounds.

The awarded 254 blocks under NELP regime are at locations in inland (114), offshore shallow water (59) and deepwater (81) areas. As a result of exploratory activities, several unexplored and poorly explored areas, in particular, offshore and deepwater areas, have been appraised through geophysical surveys and exploratory drilling. Details of exploration block awarded/ relinquished/operational are provided in Table -1.

In order to explore and produce new sources of natural gas from coal-bearing areas, the Government had formulated a CBM Policy in 1997, wherein CBM being Natural Gas is explored and exploited under the provisions of OIL Fields (Regulation & Development) Act, 1948 (ORD Act 1948) and Petroleum & Natural Gas Rules, 1959 (P&NG Rules 1959) administered by Ministry of Petroleum & Natural Gas (MOP&NG). CBM policy was aimed to provide attractive fiscal and contractual framework for exploration and production of CBM which is an environment-friendly clean gas fuel similar to conventional natural gas. In order to harness CBM (Coal-bed Methane) potential in the country, CBM blocks were offered through international competitive bidding for exploration and production for

the first time in the year 2001. Under the CBM policy, till date, four rounds of CBM bidding have been implemented by MoP&NG, resulting in award of 33 CBM blocks [including 2 blocks on Nomination and 1 block through Foreign Investment Promotion Board (FIPB) route]. Till date, most CBM exploration and production activities in India are pursued by domestic Indian companies. These CBM blocks are in the States of Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and West Bengal.

Table - 1: Details of Exploration Block Awarded (as on 01.04.2019)

Round	No. of blocks awarded	No. of blocks relinquished	No. of blocks active	Present Area
Pre NELP	28	19	9	7646.40
Pre NELP (small & medium sized discovered field)	28	4	24	2238.56
NELP-I	24	21	3	4372.85
NELP-II	23	21	2	657.05
NELP-III	23	19	4	4176.50
NELP-IV	20	16	4	1438.29
NELP-V	20	16	4	526.26
NELP-VI	52	42	10	7129.13
NELP-VII	41	30	11	14010.82
NELP-VIII	32	25	7	4217.00
NELP-IX	19	9	10	11904.00
Total	310	222	88	58316.86
DSF Round-I	30	-	53	776.75
OAPL-I	55	-	55	59282
DSF Round-II	23	-	23	2999.68
Total	108	-	131	63058.43
G. Total	418	222	219	121375.29

Source: India's Hydrocarbon Outlook, 2018-19, Directorate General of Hydrocarbons.

RESERVES/RESOURCES

As on 1.4.2019, balance recoverable reserves of crude oil were estimated at 618.94 million tonnes, out of which 341.33 million tonnes (55%) are in onshore and 277.60 million tonnes (45%) in offshore areas. ONGC (nomination) has the largest share of 70% in reserves of crude oil with OIL (nomination) and PSC regime contributing 12% and 18%, respectively.

The balance recoverable reserves of natural gas as on 01.04.2019 were placed at 1,380.64 billion cu. m, out of which 888.34 billion cu. m (64%) are in offshore and 492.30 billion cu. m (36%) in onshore areas. PSC regime has the largest share of 50% in natural gas reserves followed by ONGC (nomination) and OIL (nomination) at 41% and 9%, respectively (Table-2).

Table – 2: Balance Recoverable Reserves of Crude Oil & Natural Gas in India including Offshore Areas (As on 1.4.2019)

Area	(Crude oil in million tonnes; Natural gas in billion cu. m)	
	Crude oil*	Natural gas*
India	618.94	1380.64
Onshore	341.33	492.30
Offshore	277.60	888.34
Western offshore	235.27	323.19
Eastern offshore	42.34	565.15

Source: Indian Petroleum and Natural Gas Statistics, 2018-19, Ministry of Petroleum and Natural Gas, Govt. of India.

*Note: * Proved and indicated balance recoverable reserves. In case of Natural Gas, reserves includes Coal-bed Methane in Jharkhand, Madhya Pradesh and West Bengal.*

EXPLORATION ACTIVITIES

Conventional Hydrocarbon

ONGC, GSI and other Public & Private Sector companies continued their efforts in respect of exploration for hydrocarbon in offshore region, both shallow and deep water, during 2018-19.

Private Companies/Joint Ventures

During 2018-19, a total of 282 LKM of 2D seismic data was acquired, mostly of which is in offshore region and were carried out by Private/JVs. A total of about 6,318 SKM of 3D seismic data was acquired, majority of which was carried out by ONGC in its offshore nomination areas. A total of 126 exploratory wells and 563 development wells were drilled in 2018-19 (Table-3).

Table - 3: Exploratory & Development Efforts under Nomination & PSC Regime during 2018-19

Sl. No.	Subject	Parameter	ONGC	OIL	Pvt/JVs	Total
			(Nomination)	(Nomination)		
1	2D seismic data acquired	Onland (GLKM)	245.72	20.92	15.10	281.74
		Offshore (GLKM)	-	-	-	-
		Total 2D Seismic	245.72	20.92	15.10	281.74
2	3D seismic data acquired	Onland (SKM)	941.74	387.26	73.60	1402.60
		Offshore (SKM)	1496.68	-	3419.0	4915.68
		Total 3D Seismic	2438.42	387.26	3492.60	6318.28
3	Exploratory wells drilled	Onland	60	11	18	89
		Offshore	29	-	8	37
		Total Exploratory Wells	89	11	26	126
4	Exploratory Meterage drilled	Onland ('000 m)	152.19	29.42	45.46	227.07
		Offshore ('000 m)	85.97	-	26.42	112.39
		Total Exploratory Meterage	238.16	29.42	71.88	339.46
5	Development Wells drilled	Onland	305	22	122	449
		Offshore	106	-	8	114
		Total Development Wells	411	22	130	563
6	Development Meterage drilled	Onland ('000 m)	565.96	78.98	20.04	664.98
		Offshore ('000 m)	245.87	-	148.99	394.86
		Total Development Meterage	811.83	78.98	169.03	1059.84

Source: India's Hydrocarbon Outlook: 2018-19 — A report on exploration & production activities, Directorate General of Hydrocarbon, Ministry of Petroleum & Natural Gas.

Marine and Coastal Survey

Marine Survey

Offshore geoscientific studies both in Exclusive Economic Zone (EEZ) and Territorial Waters (TW) of India were continued by GSI.

Marine and Coastal Survey Division (M&CSD) has completed the seabed mapping of 1,32,585 sq. km out of 1,50,000 sq. km in 5 km x 2 km grid within

Territorial Waters (TW) and 18,67,199 sq. km in the Exclusive Economic Zone (EEZ) beyond Territorial Waters on reconnaissance scale. The total EEZ coverage including TW is 19,99,784 sq. km out of a total EEZ area of 20,14,900 sq. km. During field session 2018-19, R.V. Samudra Ratnakar carried out bathymetry (11,575 lkm), swath bathymetry (24,676 sq.km.), magnetic (6,167 lkm), gravity (20,125 lkm), multi-channel seismic (2,040 lkm), sub-bottom

profiling (4,212 lkm) and systematic coverage within TW by coastal vessels at 1,400 sq.km and parametric surveys within TW that included bathymetry (4,538 lkm), shallow seismic (1,522 lkm), magnetic (2,415 lkm). Marine geoscientific programme taken up comprised eight cruises onboard RV Samudra Ratnakar in deep waters and in the shallow water domain, seven cruises onboard RV Samudra Kaustubh and RV Samudra Shaudhikama each. Besides, two coastal items using mechanised boat and two RP items were also taken up during the period 2018-19.

The following marine geoscientific surveys were carried out during 2018-19 field season:

RV Samudra Ratnakar

Cruise SR-041: Study of Morphological and Tectonic setup along with Geology of North Andaman Sea within EEZ of India

Cruise SR-044: Study of the tectonic setup of Bay of Bengal and Andaman-Nicobar subduction complex within EEZ of India by systematic multi-channel seismic survey.

RV Samudra Kaustubh

Cruise ST-266: Systematic Shallow Seismic Surveys within the Territorial Waters in the Shelf Area of Digha and Sagar Island, West Bengal.

Cruise ST-269: Geophysical Surveys within The Territorial Waters off Gangapatnam, Andhra Pradesh Coast, Bay of Bengal.

Cruise ST-271: Geophysical Survey (Magnetic) within the Territorial Waters off Nizampatnam, Andhra Pradesh Coast, Bay of Bengal.

RV Samudra Shaudhikama

Cruise SD-283: Multi thematic Mapping of Contiguous Zone beyond Territorial Water in the Arabian Sea off Talikulam, Kerala.

Cruise SD-284: Multi thematic mapping of Contiguous Zone beyond Territorial Water in the Arabian Sea off Cochin, Kerala.

Airborne Geological Survey

GSI pursued airborne geophysical survey for generating database by employing magnetic and radiometric techniques through Twin Otter Airborne Survey System (TOASS). The survey was followed by data processing, preparation of aerogeophysical maps and interpretations that help in ground

evaluation and add information to geological maps and would aid prospecting and exploration of minerals. The data from the aerial surveys thus form an important backup for refining the geological understanding of an area, with focus on identification of favourable locales of mineralisation, crustal structure, etc.

Airborne magnetic & radiometric surveys over Alwar, Neem Ka Thana area, parts of Rajasthan, Haryana and Uttar Pradesh were carried out with an objective to acquire baseline aero-geophysical data and to delineate prospective mineral potential zone. The integrated analysis of aeromagnetic data along with derivative maps have enabled draw few inferences from mineral prospecting point of view: (i) The area between Dudu and Reengus seems to be potential for base metal and polymetallic mineralisation. The concealed causative body of intrusive nature extending from deep to shallower part appear to be associated with albitite-mafic rocks, (ii) the area enclosing Kanawat-Dudawas-Ajeetgarh-Chomu-Kaladera-Reengus and Kalawar-Chomu-Shahpura-Chandwaji-Jamwa-Ramgarh, mostly covered by sand, appear to be potential for base metal investigation as they are in the continuity or in the vicinity of base metal occurrences associated with the Delhi Supergroup around Neem Ka Thana and Dudawas in the Khetri, and Parallel belts in the Alwar basin and (iii) Several concealed ring/oblong structures delineated in the Tilt derivative map have shown their association with known intrusive bodies within the formations of DSG in the Alwar-Khetri basins in the vicinity of base metal occurrences.

The overall analysis of spectrometric data with the help of K, U, Th and ternary image map have shown association of (i) anomalies of high concentrations of K, Th and U with the litho-units of Sandmata Complex and the associated older granites, (ii) various formations of DSG in NDFB with the potassium anomalies of high concentrations and (iii) Post Delhi intrusive bodies (granitoids and pegmatites) in the NDFB with anomalies of all three elements (K Th and U). Therefore, the association of K anomalies of higher concentrations with the metasedimentary formations or along the contact between the formations and in the vicinity or associated with the Post-Delhi granitoids and pegmatites have to be examined for alteration zones that may be important for mineralisation.

The multisensor aerogeophysical survey over Obvious Geological Potential (OGP) and adjoining areas of blocks 1 to 4 in parts of Rajasthan, Gujarat, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Maharashtra, Bihar and Jharkhand was initiated in 2017. Interpretation of aero-geophysical data with the already available geological, geochemical and ground geophysical data has brought out several prospective mineral potential zones. Data for block 3 is being processed and interpreted. In Block-1, a total of 52,700 sq.km area were covered in parts of Rajasthan and Gujarat. Concealed ring-like structure similar to that at Siwana identified in the northern part of the survey area was delineated. A total of 16 mineral prospective zones have been delineated. Further exploration programme will be launched in these prospective zones. In Block-2, an area of 43,822 sq.km was covered in parts of Uttar Pradesh and Madhya Pradesh. New locations for potential kimberlite pipes were identified in the area SW of the Majhgawan diamond mine. The western extension of the Sonrai Basin under Vindhyan cover has been inferred. A new basin structure was interpreted along the same trend as that of Sonrai and Bijawar basins, approximately 40 km ENE of Bijawar Basin. A total of 12 mineral prospective zones have been delineated. In Block-3, the data acquisition over an area of 39,144 sq.km covering in parts of Uttar Pradesh, Madhya Pradesh, Bihar and Jharkhand was completed. The study of data is in progress. In Block-4, the data acquisition over an area of 44,861 sq.km covered in parts of Uttar Pradesh, Madhya Pradesh, Bihar and Jharkhand was completed. Twenty-nine prospective mineral potential zone for different commodities (metal, industrial & fuel) have been delineated.

Production

Petroleum (crude) and natural gas (utilised) are the mineral items produced from Offshore region. (Table - 4).

Table – 4: Mineral Production in Offshore Regions, 2016-17 to 2018-19 (Excluding Atomic Minerals)

Mineral	Unit	2016-17	2017-18	2018-19 (P)
		Quantity	Quantity	Quantity
Natural Gas (utilised)	mcm	22038	22010	21800
Petroleum (crude)	'000t	18421	18144	16868

Gas Hydrates

Gas hydrates are formed when gas and water mixtures are subjected to high pressure and low temperature conditions in the sea, usually in water depths of more than 800 m, within sediments just below the sea bottom. They are also formed in some permafrost region of the world. The gas hydrates also act as a cap under which natural gas can get accumulated. Gas hydrates can be an unconventional energy source of the future.

In India, gas hydrate research and exploratory activities are being steered under National Gas Hydrate Programme (NGHP). Under NGHP, technically coordinated by Directorate General of Hydrocarbons (DGH), various R&D studies are in progress to develop vast resources of gas hydrates in western and eastern offshore and Andaman offshore areas.

NGHP Expedition-01 exploration programme was carried out in 2006 for mapping gas hydrate zones in Krishna-Godavari, Kerala, Konkan, Mahanadi and Andaman offshore areas. A total of 39 holes were drilled at 21 sites and the physical presence of gas hydrate was established predominantly in Krishna-Godavari, Mahanadi and Andaman Basin in clay dominated complex geological settings.

NGHP-02 was conducted successfully in Eastern offshore from 09.03.2015 to 31.07.2015. A total of 42 wells were drilled at 25 sites in Krishna-Godavari and Mahanadi areas in sand reservoirs for gas hydrates. NGHP-02 has discovered two world class gas hydrate reservoirs, namely, Block KG-DWN-98/5 and Block KG-DWN-98/3. Based on the post-expedition studies and review by international experts, the site located in KG-DWN-98/5 has been found suitable for pilot production test during NGHP-03 expedition for which various studies like sand control measures, well design, reservoir and production simulation modelling as prerequisite for the pilot production have been completed.

The challenges faced for commercial exploitation of gas from gas hydrates are more or less similar all over the world. Extracting methane from gas hydrate in marine environments is relatively a new path. Japan has taken a lead in this direction. From the progress being made by the Indian NGHP, steps are underway to mitigate anticipated challenges in the Indian context. The NGHP expeditions are an appropriate line of research investigation which could help the country move forward by harnessing this yet elusive resource.